JTTEE5 5:215-221

A History of the Nooter Metallizing Department, St. Louis Metallizing Company: A *JTST* Historical Paper*

W.B. Meyer

1. Foreword

As I bow out of active participation at St. Louis Metallizing Company (SLM), I do so with a good feeling that it will continue to prosper, grow, and provide a good future for all who are employed here. This has been a good and interesting life for me, and I am grateful to have had the opportunities that have been afforded me.

On July 1, 1977, the St. Louis Metallizing Company will be 25 years old** as a separately incorporated company. Actually we are much older since the predecessor, Metallizing Department of the John Nooter Boiler Works Company, dates back to 1934.

On this anniversary, we should look back and see from whence we came. Also, because I am retiring on January 14, 1977, it is only natural that I am looking back over the years that I have spent in this business. All but four of these forty-two years that I have spent in this business have been with the Nooter Corporation. This includes the time here at the St. Louis Metallizing Company.

I started out to write this as a history of the Nooter Metallizing Department and the St. Louis Metallizing Company, which succeeded it. But I can't seem to do that without bringing myself into the story too frequently. The story of my industrial life is so inextricably entwined with the history of our company that I can't seem to discuss one without bringing in the other.

What I am writing here is one man's point of view. Someone else might view it from an entirely different angle. This story is being told in the first person. You will find me writing "me," "I," and "us" far too often. In fact, this also turns out to be rather much of an autobiography of my industrial life. I hope that you will understand. It seems to be the only way that I can tell the story.

There are many, many people who have helped SLM and me along the way. Our company is the result of team effort, and there were, and are, many people on that team. I will mention many of them in the course of this story. I hope that I will not miss any of them. Like all successful enterprises, the story of metallizing at Nooter and at the company later called the St. Louis Metallizing Company is the story of people—many good and dedicated people.

*Paper edited by C.C. Berndt (SUNY at Stony Brook). This historical paper is reprinted from the internal files of St. Louis Metallizing, MO, USA. The Editor thanks F. Martin and J. Stricker for this contribution. Several headings have been added to assist with the clarity and guide the reader. Mr. Meyer is a 1995 inductee into the ASM Thermal Spray Society Hall of Fame. He passed away in October 1979.

**Since this paper was written in late 1976, SLM is presently 45 years old.

W.B. Meyer, St. Louis Metallizing Company, St. Louis, MO, USA.

2. How Metallizing Began

2.1 *The Very Early Years*

Dr. M.U. Schoop of Zurich, Switzerland, built the first metal spraying equipment in 1910. It consisted of pouring molten metal into a high-pressure gas stream. Two years later, he and his associates developed equipment that would spray metal in wire form. This was done the year that I was born. Thus began the development of the metal spraying industry by which we make our livings today. Much trial and error had to take place before it became a commercially acceptable process.

Dr. Schoop once worked for Thomas A. Edison in his laboratory at Menlo Park, New Jersey. There he did research on finding a new method for making lead powder to be used as a paint pigment. Some say that in the course of this research he conceived the idea of spraying molten metal. It is known that when he left the employ of Thomas Edison he went back to Switzerland and filed his patents for the molten metal spraying process.

Just before World War I, he sold rights to manufacture equipment to a company in Germany called Metallizator, but these were not worldwide exclusive manufacturing rights. After the war, Metallizator made equipment that was sold or leased throughout Europe, in England, and in the United States. This took place in the early 1920s.

Following the stock market crash in 1929, and in the depths of the Great Depression that followed (while I was in high school), the first American metal spraying unit was designed and built by the Metallizing Company of America located in Los Angeles. This company still exists and makes the present Mogul equipment.

2.2 *The Beginning of Metal Spray in the United States*

By 1931 Dr. Schoop's original patents had expired. The group of young men who comprised the Metallizing Company of America set out to try to make their fortunes by manufacturing and selling metallizing equipment. The president of the company was Larry Kunkler. Assisting him were Charles Boyden, Sr. and his son of the same name who were the designers of the first 3-in-1 metallizing gun. SLM has two of these original models. One was my own demonstration unit when I was with the Metallizing Engineering Company, and the other we acquired later. In sales for the new company were Larry Kunkler, Rea Axline (who later founded the Metallizing Engineering Company

that is now Metco), and Charles K. Stipp (who was the founder of a job shop in Chicago called Metallizing, Inc., then went with Metco where he took my place in Chicago, and who is now retired).

There is a charming old gentleman living in England whom I have been privileged to know. He is William Ballard and founder of Metallisation, Ltd. in the early 1920s. He is also the author of "Metal Spraying and Sprayed Metal." Bill Ballard knew Dr. Schoop quite well and has told me much of the information that I have about the inventor of our process. Ballard says that metallizing is a disease, an incurable disease. Once it gets in your blood, he says, there is no way of ever getting away from it again. I think that the old gentleman is right. Metallizing is a delightfully incurable disease.

In the early 1930s, there was a welding supply house here in St. Louis that was the local sales agency for metallizing equipment and supplies. This was Halpin, Kohlbry and Clements (maybe the three names were in a different order). The company was located in the small brick building at 311 S. Sarah Street that now houses the offices of the U.S. Steel Warehouse. That brick building has since been added onto.

Breen Halpin had the most to do with selling metallizing equipment for this company. In 1933 Breen Halpin sold a metallizing unit to the Schroeder Welding Company also here in St. Louis. I have been told that this was the first American-made metallizing gun ever sold to a job shop. The owner of the shop was Armin "Pop" Schroeder, a very genial and warm hearted man. The Schroeder Welding Company still is in business at the same location on Washington Avenue. It is now operated by Pop Schroeder's youngest son. His oldest son operates the metal spraying equipment in the bottling plant at Anheuser Busch.

3. How the Nooter Metallizing Department Began

The Metallizing Department had its beginning in 1934 when a 3-in-1 metallizing unit was bought from Breen Halpin for the purpose of lining steel tanks with stainless steel, nickel, and Monel. It was hoped that this would be cheaper than tanks made from those alloys and thus become a competitive advantage. This, of course, was doomed to failure because of the inherent porosity of sprayed metal coatings. Breen Halpin either did not know that sprayed metal was porous, or else he studiously avoided mentioning it.

I remember that we, who were selling the equipment, were instructed to avoid the subject of porosity. When it was brought up, we were told to quickly change the subject. Later on we came to know that the porosity of sprayed metal was often an advantage.

The first 3-in-1 metallizing unit cost the John Nooter Boiler Works Company $350 plus the gauges and hoses.

The very first operator of the unit was Harold A. Frith, then the shop superintendent. You must know that in those early days, near the end of the Depression, he only had 25 or so men to superintend. Mr. Frith was known to all of his friends and employees as "Chappie" because he came from Leicester, England, while still a young man. He later became a vice president of Nooter and a member of its Board of Directors. Chappie was always a gentleman and a compassionate man, but he was, nevertheless, a stern and demanding taskmaker. He was both a friend and a mentor to me all through the years until his death. He was a very good and valued friend to all of us here at the St. Louis Metallizing Company.

Other people who later took over the operation of the metallizing equipment at Nooter in those early times were Bill Mason (later the superintendent of the Field Department) and then a young man who was Nooter's first college graduate. That was Arthur S. Schwarz, a graduate of the Rolla School of Mines, who had previously worked at Curtis-Wright as a draftsman. Arthur later became the president of Nooter and then the vice chairman of the board of directors. He was the chairman of the board here at the St. Louis Metallizing Company in 1970 and 1971.

4. How Walter Meyer Got into Metallizing

At this point I need to insert my background in metallizing in the four years previous to joining the John Nooter Boiler Works Company. I grew up in Staunton, Illinois. This was then a coal mining town, and all of my family worked in or at the mines. I worked at one of the nearby mines before I went to Illinois College at Jacksonville, Illinois, in 1931.

During the summers of 1933 and 1934 (the years of the "Century of Progress" World's Fair at Chicago) I worked at the Museum of Science and Industry in that city's Jackson Park. In the Museum was (and still is) an exhibit coal mine. The coal that is in this coal mine came from near my hometown from a mine of which my father was the superintendent. That was why I came to be employed at the Museum of Science and Industry.

When I graduated from Illinois College in 1935, there were few jobs available, so I went back to the Museum of Science and Industry as a floor attendant, who conducted the visitors through the various industrial exhibits and explained them.

One noon, as we sat at lunch, one of the Museum's curators described to us some equipment that he had seen in operation the night before at the Metal Show in Chicago. He said that wire was fed into it, melted, and then sprayed out in a metal coating just like a paint spray gun lays down a coating. This sounded very far fetched to us. This man (Mr. A.C. Carlton) went on to tell us that they had "sold" the manufacturers on the idea of installing some of the metallizing equipment in the Museum as a working exhibit. I asked to be assigned as the operator, and my request was granted. That was how I came to meet William C. Reid, midwestern branch manager of the Metallizing Engineering Company, Inc. He came to the Museum and showed me how to operate the gun. This took place in October 1935.

In the spring of 1936, I asked Bill Reid for a job with the Metallizing Engineering Company, Inc. and was hired in March of that year. Bill Reid is another man who came from England. He has since left the metallizing field and now lives in retirement in Newcastle, Pennsylvania. I still hear from him and his wife at Christmastime.

My training for the new job consisted of spending a week in the shop of Metallizing, Inc. and then working for that company on a job at the A.O. Smith Company in Milwaukee where we sprayed three refinery fractionating columns with aluminum. After that I spent two weeks making sales calls with Bill Reid and demonstrating the equipment. Then I was sent to St. Louis

on my own as the "expert" sales and service engineer for an area consisting of Missouri, Iowa, southern Illinois, Kentucky, southern Indiana, Tennessee, and Arkansas. I was on my own at the age of 24, and the great adventure began.

5. The Growth of Metallizing at Nooter

5.1 *Early Experience with Metallizing*

Once the John Nooter Boiler Works Company found that the metallizing process was not suitable for lining tanks with the hard metals, they began lining them with zinc, aluminum, tin, and a zinc-tin combination. The latter coating was mostly used on the inside of tank cars and storage tanks handling phenol for the nearby Monsanto Chemical Company. Aluminum-sprayed linings were also applied to vessels for the Socony-Vacuum Oil Company in East St. Louis, Illinois. Many of the zinc coatings were used on equipment in ice plants. Ice making was a big business in those days.

When I first came to St. Louis as the metallizing salesman, my first call was on the John Nooter Boiler Works Company. I was introduced to Art Schwarz. He was tall, thin, and blond and was on crutches because of an injury incurred in a company softball game.

I helped introduce the Nooter people to mechanical build-up work by means of metal spraying. They had done some of it but had no confidence in the mechanical bonding of the coating. They had but recently gone into welded construction and could think only in terms of a fusion bond. Almost all of their prior metal spray work had been in the corrosion-resistant coating field. I had learned a small amount about build-up work from Bill Reid while working at Metallizing, Inc. and from Pop Schroeder here in St. Louis who was also my customer. The rest I learned by trial and error as I helped Art Schwarz from time-to-time at Nooter.,

5.2 *Experience in the Field*

When I went to work for the Metallizing Engineering Company, Inc., the field sales and service engineers were permitted to do actual metal spray applications with their demonstration equipment so long as they did not interfere with the business activities of any of their customers. Often a field engineer would work up an application at a large industrial plant and then could not find a contractor that was willing to do the job. Then the metallizing salesman often would do the job himself. I remember that we would "hire out" at $40 per day plus all materials. 40% of that $40 would be credited to our drawing account. Therefore I was able to make $16 per day on such jobs. My drawing account then was $120 per month, and I was paid the usual expenses such as mileage at 3 cents per mile with hotel and meals not to exceed $6 per day. I earned much of my commissions doing such field work.

One of these jobs was the spraying of the flat surfaces of the deck beams on the Kaw River Bridge that leads from Kansas City, Missouri, to Kansas City, Kansas. This bridge leads directly into the stockyards, and the drippings from cattle and refrigerator cars badly corroded the steel below. Refrigerator cars in those days were cooled with an ice and salt mixture. With the later advent of mechanical refrigeration, this part of the problem no longer existed.

In the two weeks just prior to my marriage in 1936, I sprayed those surfaces with zinc for the Missouri Pacific Railroad. In this operation I was assisted by one of their bridge and building crews. That zinc coating is still intact today after 40 years of service. As a result of this application, I later sold to the Missouri Pacific Railroad metallizing equipment that was used in protecting other bridges and structures. One of these is a bridge at Dupo, Illinois.

I also sprayed my first printing cylinder in 1937 at the plant of Crowell-Collier Publishing Company in Springfield, Ohio. It was a very large cylinder, and the spraying was done at the customer's plant. Another job that I did in 1937 was the spraying of the interiors of three carbon dioxide storage tanks. This was done at the Leader Iron Works in Decatur, Illinois, for the Pabst Brewing Company at their Peoria, Illinois, brewery.

When Metco marketed their first metal spray unit in 1938, the application of coatings by field engineers was discontinued. In those early days, it was very hard to sell metallizing equipment. It was something new that had never been used before. It was untried in the eyes of most people. And it was being sold at a time of great depression in the nation's economy.

5.3 *Equipment Sales*

My first sale of equipment was to the Ashley Street plant of Union Electric. Mr. Simon C. Tracy, the secretary-treasurer of the John Nooter Boiler Works Company, called me one day and asked if I would like to sell a metallizing gun immediately. He took me to his friends at the Ashley Street plant and told me to list for them the items that they needed on their purchase requisition, which would enable them to begin metallizing.

The Shell Oil Company in Wood River, Illinois, owned one of the 3-in-1 metallizing units and had it "on the shelf." I convinced them to put it back into use and helped them make it work. They then bought a new and larger Mogul unit from me on the condition that I take the old unit to their refinery in Arkansas City, Kansas, and show them how to use it.

5.4 *Surface Preparation*

The only method of preparation in those days was to rough thread a shaft. This depended entirely upon the operator's conception of how rough to make a rough thread and upon the susceptibility of any given analysis of metal to be roughened. This operation was performed by grinding a threading tool so that it pointed below the center line of the shaft. As the shaft revolved at a fairly low speed, the tool literally tore the metal out. This resulted in many cracks along the sidewalls of the threads. The molten-sprayed metal was driven into the cracks and keyed on tightly. Many machinists had difficulty in making rough threads because that is what they were taught NOT to do. I soon found it best to teach a nonmachinist how to do this. The fact that I was not a machinist probably was the reason that I became adept at rough threading.

Very often people would then grit blast a rough thread for extra insurance. Sometimes an alloyed metal would not roughen up by threading no matter what one did.

At any rate I did get Nooter started in building up machine parts. As I made sales calls in the area, I often encountered plants where they wanted this type of work done on a contract basis. I referred this work to Nooter and Schroeder. There were problems at first, but we did make progress. We all learned by our mistakes, and soon we became skilled at it.

One of the early jobs that I helped Arthur do was the metallizing of a set of printing cylinders from a Harris press. This was in early 1937. The cylinders had a wide gap and serrated edges along that gap. These serrations had to be masked off by inserting steel blocks, which were held in place by a bar beneath. The preparation was by undercutting, threading, and then grit blasting with Joplin Chatt. The sprayed-on buildup was done with the then new stainless steel #2. This work was done for the Essmueller Company on nearby S. 8th Street. Our friends there were Tony Ruth and Del Chapman.

5.5 *The Move to Nooter*

Nooter began doing more and more metallizing work. There was a need to move Art Schwarz into the office because business was improving and the Depression was rapidly coming to an end. The war in Europe added impetus to business and manufacturing in this country.

A replacement for Art in the shop was sought, and I was approached to accept that job. After much thought, I declined because I felt obligated to the Metallizing Engineering Company inasmuch as I had not yet met my drawing account. I disliked leaving them while still theoretically owing them money. Shortly after that, I became the top salesman in the country when I made the sales to Union Electric and Shell Oil plus the largest sale of parts ever to Servel, Inc. in Evansville, Indiana.

For this, I was promoted to replace Bill Reid in Chicago when he was moved to New York as vice president and sales manager of Metco. This was in the fall of 1937. My new territory then became Minnesota, Michigan, Illinois, Iowa, Missouri, Arkansas, Kentucky, Tennessee, Ohio, and Indiana. Meanwhile, a man named Paul Ehrenfest was hired to take Art's place at Nooter when the latter moved into the office. Paul became the operator of the metallizing equipment along with many other duties.

On January 3, 1939, I came back to St. Louis as an employee of the John Nooter Boiler Works Company. In the meantime, I had been moved from Chicago to Milwaukee by Metco. When I was offered another position in New York, I declined and came back to Nooter for the job that I had been offered a year and half before.

As I have said, it was Chappie Frith who hired me and put me to work as the metallizing operator, tester of tanks, and other odd jobs within my capabilities. By that time, Paul Ehrenfest was no longer with Nooter. Art Schwarz, now in the office, made the sales contacts and did the estimating for metallizing along with his many other duties. I did the spraying for him. In a surprisingly short time, we had more metallizing business than I could spray by myself.

Chappie then hired an assistant for me. His name was Charles S. Lewis, the son of the founder of a pump manufacturing company of the same name. Charlie later left us to work at a munitions plant. He then went into military service and is now in an engineering capacity at the American Pulverizer Company.

To succeed him, a man from the Nooter Machine Shop was transferred to the Metallizing Department. He was Donald S. Hodge. Sam had learned his trade while working for Joseph Sunnen. In those days, the Sunnen Company was very small, and the automotive equipment for which they later became so famous was manufactured in Joe Sunnen's garage. This was where Sam learned his trade.

Art Schwarz taught me the intricacies of estimating with the idea in mind that I would come into the office where I would handle sales calls and estimating on metallizing work. In addition I was to work as a sales representative and estimator on field work under Harry Nooter. The transition from the shop into the office took place in 1940.

There was already a parts shortage because of the war in Europe. Often the metallizing of a worn part was the only way by which a factory machine could be gotten back into service. Many people who did not believe in metal spraying before this were forced to resort to it and were pleasantly surprised at the results.

The Metallizing Department still was not big enough to require a full-time man in the office. Ernie Worthington, of the Nooter Field Department, taught me to estimate smokestack replacement, boiler repairs, and tank erection. I did this along with handling the Metallizing Department. At times, we ran short of helpers on rigging jobs or a boiler repair job. I would change clothes and go out on such jobs as a helper. This enabled me to learn from the mechanics themselves what was involved in this kind of work.

5.6 *Metallizing Work Increases*

Mr. John Nooter was around at this time period. He would often see me dash out of the office in work clothes, and it impressed him. He used to sit and talk to me by the hour explaining our business and its ramifications. He was the founder of the John Nooter Boiler Works Company in 1896. He came from Holland and had been a sailor in the days when ships were propelled by the wind blowing into the sails. He was killed in an auto accident not too long after the events that I described above.

Mr. John Nooter began business by repairing used boilers in his backyard and by working on smokestacks. His wife often helped him by bucking the rivets as he drove them. He later began making boilers and riveted tanks, and this is how the business began.

The volume of metallizing work continued to increase, and in 1943 I left the Field Department in order to concentrate more on metal spray work. At this time, I also handled the one-man (part-time) Nooter Advertising Department. I also became the editor of the "Boilermaker."

Our country was well involved in World War II by this time. There were many calls for the metallizing of a wide variety of equipment. There was a great shortage of crankshafts for power plant diesel engines as well as for the engines in earth-moving equipment. We rebuilt many of these and finish ground them with one of the early Sunnen crankshaft grinding attachments.

Much of our other work was ground in a lathe using a tool post grinder that swung a 28 inch grinding stone. This was a homemade affair that had been built by Sam Hodge. It was our sole grinding equipment for a good many years. There are a few of the people still here who remember it.

Early in the establishment of our Metallizing Department, Chappie Frith bought me a used lathe from the defunct Ball Ice Machine Company. Philip DeCastaby Ball had once owned the St. Louis Browns baseball team. That lathe is still here at SLM. It is the one that Dan Everitt sprays in. Some of the people who worked in the Metallizing Department in those very early days were John Bates (who is still at Nooter), Bernard Plant, Claude Stevens, Robert Bays, and others along with Sam Hodge and me. On occasion Charlie Hibbler would help out on a large spray job. Charlie is now the head of the machining department at Nooter.

Early in 1940, there was something done about more adequate bonding of metal-sprayed coatings. Metco developed and sold the first fuse bonding equipment. It was an adaptation of an existing piece of equipment that was used to fill the scored places in cylinder walls of automotive engines. This was the result of wrist pins coming loose and scraping the cylinder walls.

The first electrode handles on the fuse bond machines were not air cooled. Consequently the nickel electrodes would heat up and deposit large globs of metal that would cause large lumps in the finished coating. Sam Hodge solved the problem by making an air-cooled electrode holder. He did this by modifying a conventional welding handle with copper strips and running a compressed air line to it. When Metco saw this innovation, they asked for permission to copy it. This permission was granted, and their air-cooled electrode holder became standard equipment.

5.7 *A Case Study of Metal Spray Solving an Urgent Problem*

Not long after I began working at Nooter in 1939, I was at a lathe undercutting a shaft in preparation for spraying it when Mr. Oscar Pfeffer, the superintendent of the Busch-Sulzer Brothers Diesel Engine Company, came up to me and brusquely told me to come with him. I asked where we were going. He said to his plant, which was on S. Second Street near the Anheuser-Busch Brewery. I protested that I could not leave the Nooter plant without Chappie's permission. He said, "The hell with him. I have got problems, and I need you to help me out." Chappie was a good friend of Mr. Pfeffer's, and he told me that I had better go with him and see what the trouble was.

I found that Busch-Sulzer had made an error in the fits of the bearings on the journals of the Root-Connorville type blowers that had been installed in an entire series of diesel engines. The bearings were coming loose on engines that were already installed on ships, and they were breaking down on the high seas and in ports all around the world.

I brought the Nooter metallizing equipment into their plant and spent six weeks there spraying up these bearing fits as they were brought in from the field. We had a setup where the surfaces were prepared in one lathe. I sprayed them in another, and the surfaces were finished in the adjacent cylindrical grinder. That was when I made up my mind that some day we were going to have a cylindrical grinder of our own. When Chappie came to see how I was getting along, I pointed this grinder out to him.

Mr. Pfeffer told me to work as long as I could each day and to never mind about the cost. I often put in 12 to 14 hours. Meanwhile there was work to be done at Nooter. Whenever I could sort of sneak away from Mr. Pfeffer, I would go to Nooter and catch up on work there.

5.8 *Experience Overseas during the War*

Late in 1944, I was contacted by the Ordnance Department of the U.S. Army and asked to go to China, Burma, and India (CBI) where I was to set up metallizing equipment in the military overhaul bases and also to teach both military and native personnel in its use. The Pentagon had approached the Metallizing Engineering Company for someone to do this. But my former employer referred the Army to me as the one most suited to perform this mission. Mr. Robert J. Ryan, vice president and general manager of Nooter, gave his consent for me to accept this assignment. It was to have been of two months duration, and I was to take an assistant with me who was to be left there to carry on when I returned home.

This assistant turned out to be Thomas H. Lufkin from California. Tom had worked for Metco on two separate occasions, also in the West Indies and in England. His brother was George S. Lufkin, the secretary-treasurer of Metco. Tom was injured on the Ledo Road in India when his jeep ran head-on into a loaded 6 by 6 GM truck. He was sent home by ambulance plane, and I wound up staying in China, Burma, and India for more than six months. To this was added another six weeks in Italy working with the GI's in that theater of war.

While in China-Burma-India (CBI), we set up metallizing equipment in five heavy automotive maintenance shops and at one Corps of Engineers Maintenance Shop. These were located in Calcutta, Chabua, and Ledo in India; Myitkyina, Burma, and Chan Yi and Kunming in China. Two of these installations stand out greatest in my memory for reasons that will become obvious.

One was the 885th Heavy Automotive Maintenance Company at Myitkyina. Here was a hard-working complement of soldiers operating a base shop housed in a building that was nothing more than poles supporting a thatched roof. There were no walls around the building at all. It was located in one of the wettest places on earth. In monsoon season, the place was knee deep in mud.

The man who was in charge of the 10 man machine shop was a technical sergeant named Raymond Cravens. Ray had first encountered metallizing in 1941 while stationed at Fort Bliss in El Paso, Texas. He worked for a while in a civil service machine shop that was on the base at Fort Bliss. This shop had a Mogul metallizing unit that Ray learned to operate by reading the instruction manual.

Ray came to us at Nooter in 1946 as the foreman of the Metallizing Shop. I had recommended to Chappie that we hire him. When he approved it, I then contacted Ray in Southern Indiana, and he came to St. Louis to join us. Ray was one of only three people who ever came to SLM with previous experience in metallizing. The other two were Bernard Plant (at Pratt and Whitney Co.) and Charlie Jolly (at the Granite City Army Depot).

At Chan Yi, China, I met another man that we all know. At the 441st Ordnance Company was Dan Everitt. He was involved in the rebuilding of truck engines along with a group of Chinese workmen. I taught others in the operation of metallizing equipment, and Dan learned it after he joined us at Nooter late in 1945.

All of the shops that I set up in the CBI kept a log of all jobs that were metal sprayed. During the time that I was in that theater

of war, 2500 separate items were reclaimed by metallizing. There were no replacements for these worn parts in that part of the world. The lack of them rendered many vehicles inoperative. It can truthfully be said that metallizing put 2500 vehicles back into service where they were badly needed in fighting the war.

During that entire trip of almost 8 months, I traveled about 36,000 miles. Most of it was by airplane, but some of it was by truck and also by narrow gauge, wood-burning locomotive. I drove an English-built cab-over-engine Chevrolet truck over the Ledo and Burma roads from India into China. This was distance of 1200 miles and required 16 days. Ours was the first big convoy (115 trucks and 7 jeeps) to travel that route after it was built. My cargo was drums of gasoline, mortar shells, and metallizing equipment.

5.9 *Return to Nooter from the War*

While I was away, the Metallizing Department at Nooter was operated by Harold Schultz (who has just this year retired from the Plumbing Industry Council). He made the calls on the customers and did the estimating. Art Schwarz kept an eye on the whole operation while Sam Hodge ran the shop.

En route home from the CBI, I set up three more metallizing installations at military bases in Italy. When I returned in August 1945, the Metallizing Department was in sad shape. After much hard work for the balance of that year, we finished up with a business volume of but $28,000. A year later, we were back to near a $100,000 volume.

Just prior to going overseas, one of our larger jobs was the rebuilding of pump plungers for the Shell Pipeline Company. These plungers used to come to us by the truckload. While I was away, the shop got "the bright idea" of not undercutting them. They merely buffed them with a flat buffer, applied a weld bead at the pressure, and then grit blasted the smooth, unthreaded surface. They were then sprayed with stainless steel #2. The final finishing was done with the homemade tool post grinder.

However there was just enough incidence of failure to make this procedure too risky. When Ray Cravens took over the shop in 1946 (Sam Hodge left in November 1945), we were reworking these plungers by the truckload. Eventually we lost the work altogether.

During World War II, a large pipeline was built from Texas to the East Coast to carry oil to the eastern refineries. This was government financed and was called "The Big Inch Pipeline." Immediately after its start-up, the weld splatter and other abrasive particles trapped in the line scored the packing sleeves on the centrifugal pumps.

These were brought to our Metallizing Department in large quantities where they were rebuilt and immediately returned to service. This achievement, along with the manufacture of tanks for the culture of penicillin, helped the John Nooter Boiler Works Company win an Army-Navy E for excellence in production.

6. List of Companies and Places Mentioned

441st Ordnance Company
885th Heavy Automotive Maintenance Company
A.O. Smith Company (Milwaukee)
American Pulverizer Company
Anheuser-Busch Brewery
Ball Ice Machine Company
Busch-Sulzer Brothers Diesel Engine Company
Calcutta, Chabua and Ledo (India)
Chan Yi and Kunming (China)
Corps of Engineers Maintenance Shop
Crowell-Collier Publishing Company (Springfield, Ohio)
Dupo (Illinois)
Essmueller Company
Fort Bliss (El Paso, Texas)
John Nooter Boiler Works Company
Kaw River Bridge (Kansas City)
Leader Iron Works (Decatur, Illinois)
Ordnance Department of the U.S. Army
Metallisation, Ltd. (UK)
Metallizator (Germany)
Metallizing Company of America (Los Angeles)
Metallizing Engineering Company, Inc. (Later to become Metco)
Metallizing, Inc. (Chicago)
Metco, Inc.
Missouri Pacific Railroad
Mogul
Monsanto Chemical Company
Museum of Science and Industry (Chicago)
Myitkyina (Burma)
Nooter Corporation
Pabst Brewing Company (Peoria, Illinois)
Plumbing Industry Council
Schroeder Welding Company (St. Louis)
Servel, Inc. (Evansville, Indiana)
Shell Oil Company (Wood River, Illinois)
Shell Pipeline Company
Socony-Vacuum Oil Company (Illinois)
St. Louis Metallizing Company
Sunnen Company
"The Big Inch Pipeline"
Union Electric

7. List of People Mentioned

Rea Axline
William Ballard
John Bates
Philip DeCastaby Ball
Robert Bays
Charles Boyden, Sr.
A.C. Carlton
Del Chapman
Raymond Cravens
Thomas A. Edison
Paul Ehrenfest
Dan Everitt
Harold A. "Chappie" Frith
Breen Halpin
Charlie Hibbler
Donald S. "Sam" Hodge

7. List of People Mentioned (Cont'd)

Charlie Jolly
Larry Kunkler
Charles S. Lewis
George S. Lufkin
Thomas H. Lufkin
Bill Mason
Harry Nooter
John Nooter
Oscar Pfeffer
Bernard Plant
William C. Reid
Tony Ruth
Robert J. Ryan
Armin "Pop" Schroeder
Arthur S. Schwarz
Harold Schultz
M.U. Schoop
Charles K. Stipp
Claude Stevens
Joseph Sunnen
Simon C. Tracy
Ernie Worthington